4. MINIMUM SYSTEM REQUIREMENTS AND SOFTWARE INSTALLATION

4.1 Minimum System Requirements

The system runs under Microsoft® Windows™. The minimum system requirements are provided below:

- Windows Version 3.1
- 80386 processor
- 4 megabytes RAM
- 10 megabytes hard disk space

NOTE: A math coprocessor is recommended but not required.

4.2 Installing the Software

STEP 1. Insert the QUAL2E Setup Disk (i.e., QUAL2E - DISK 1) into drive A or drive B.

NOTE: You must have 10 megabytes of space on the hard disk drive on which you are installing QUAL2E for Windows. **Close all open applications, including FILE MANAGER, before you start the setup program.**

STEP 2. Start Windows, and then choose File Run.

STEP 3: Type A:SETUP (or B:SETUP if the disk is in the B drive). Click on the OK button or press ENTER.

STEP 4: You will be asked to enter the location of the directory where you would like QUAL2E to be loaded. When you confirm this or enter a new directory, the loading will begin.

Please note that the QUAL2E Windows interface consists of two disks.

STEP 5. You are now ready to use QUAL2E.

5. USING THE QUAL2E WINDOWS INTERFACE

Once you have finished loading the software, you will be ready to access the QUAL2E Windows interface. This section details how to use the capabilities available in the QUAL2E interface. It describes the following:

- Accessing an Existing File or Opening a New File
- File Naming Conventions
- Saving Input Files
- Setting Up a Default Editor for Viewing Output Files
- Submitting an Input File to the Model
- QUAL2E Windows Interface Commands and Function Keys
- Import File Option in QUAL2E
- How to Use the Graphics Routine
- Array Screen Capabilities
- Unit Conversion

5.1 Accessing an Existing File or Opening a New File

When you first enter the QUAL2E Windows interface, you will be automatically assigned a new file. The new file name and number will appear at the top of the screen in parentheses, for example, (QAL2E###.INP).

To access an existing file, click on the FILE option on the very top line, select the OPEN option, and select the file you want from the list that appears. If you made any changes to the previously opened file, you will be asked whether you want to save the file. This is to remind you that opening a new file will overwrite the existing screens. The QUAL2E Windows interface does not allow you to open more than one input file concurrently.

NOTE: The input files must be in the same location as the *.EXE files (the QUAL2E executable files). If you elect to read in an existing file from a different directory, the directory in which the file is located becomes the default directory for QUAL2E. All the data files for QUAL2E must exist in the default directory. It is strongly recommended that you not save input files in any location other than the QUAL2E directory.

5.2 File Naming Conventions

All files created by QUAL2E in Windows have a file naming convention as explained below:

1. The first five characters are the function name (i.e., QAL2E); the next three digits are sequentially assigned numbers that indicate the number of the input file that you are currently creating.

2. The file extension indicates the type of file, as explained below:

File Names	Description of the file
QAL2E###.INP	QUAL2E Windows Interface Input file This file contains all the input data required for QUAL2E in one file.
QALGR###.INP	QUAL2E Windows graphics file This file contains all the input data that were entered to create a particular graph.

The following input files are generated by the QUAL2E Windows interface when you choose to submit the QAL2E###.INP file to the model for execution. These files can be read by the interface later through an IMPORT function. These files will be in your directory.

QAL2E###.RUN	QUAL2E input file
QAL2E###.DO	Observed Dissolved Oxygen data file
QAL2E###.CLI	Climatology data file
QAL2E###.UNS	Uncertainty input file
QAL2E###.VAR	Variance uncertainty input file

Note that the QAL2E###.RUN file is always required for a QUAL2E execution. It is the actual input file for the program. The RUN file is generated by the QUAL2E Windows interface prior to executing the program. You have the option of importing an existing RUN file into the QUAL2E Windows interface. Always save your current file before importing a RUN file because the imported file will overwrite all the values on the screens without giving you a choice. Other input files are optional depending on the data availability and the simulation type. The DO file is used when observed DO data are available. The CLI file is needed for quasi-dynamic simulations. The UNS and VAR files are needed for the uncertainty analysis. Two additional files are generated by the program: QAL2E###.DOU and QAL2E###.RCH. These files remain invisible. A schematic of all the files and their uses is given in Figure 5.1.

Output Files

These files are generated by the QUAL2E model:

QAL2E###.OUT	QUAL2E model tabulated output file
QAL2E###.DOU	Simulation results in data blocks

5.3 Saving Input Files

If you opened an existing file to edit, when you choose to save the file, the existing interface input file will be overwritten with the new values unless you choose the SAVE AS option under FILE menu and assign a new file name. If you are assigning a new name to a file, remember to follow the naming conventions described in section 5.2.

QUAL2E will ask you whether you wish to save the interface input file when you exit the interface functions or when you reach the last screen of an interface function. However, if you have accessed an existing file and made all the changes before reaching the last screen, you may save the input file by proceeding to the FILE option and selecting the SAVE option. Once you have completed an interface input file, you may submit it to the QUAL2E model for execution. When you submit the interface input file to the model, the input file will be validated by the Windows interface. If any error is detected (e.g., a BOD decay value of more than 2 or a latitude value outside the range of 0-90 degrees) during the validation, you will be informed of the error and taken to the incorrect entry so that you can correct it immediately.

5.4 Setting Up a Default Editor for Viewing Output Files

The default editor for viewing and editing QUAL2E output files is the WRITE program in Windows. However, you may choose any other data editor (e.g., EDIT.EXE) for viewing the output by selecting the Utilities menu on the top menu bar of the screen and using the Setup Output File Viewer option. The path and executable name of the output file editor should be specified under this option. If you do not have any special text editor to choose, you may check the default WRITE.EXE setup using the above-mentioned procedure.

After each execution of QUAL2E from the Windows interface, you will be asked whether you want to view the OUT file. If you decide to see the output, the *.OUT file will be opened using the editor of your choice. It is important to note that the QUAL2E Windows interface does not have any button or menu item that allows you to see an existing output file without running the program. You may want to use WRITE in the ACCESSORIES group of the Windows Program Manager to open, edit, and save an output file at any time. Select all the texts in the file (by clicking before the first character of the output file and dragging the mouse pointer to the end while keeping the left mouse button pressed), and choose the landscape option in Print Setup under FILE menu to avoid wraparound of text. Additionally, when the text is selected, you may switch to a fixed width font, such as Courier or Line Printer, to see the text vertically aligned. Click on the Fonts option under the Character menu to open the font selection box.

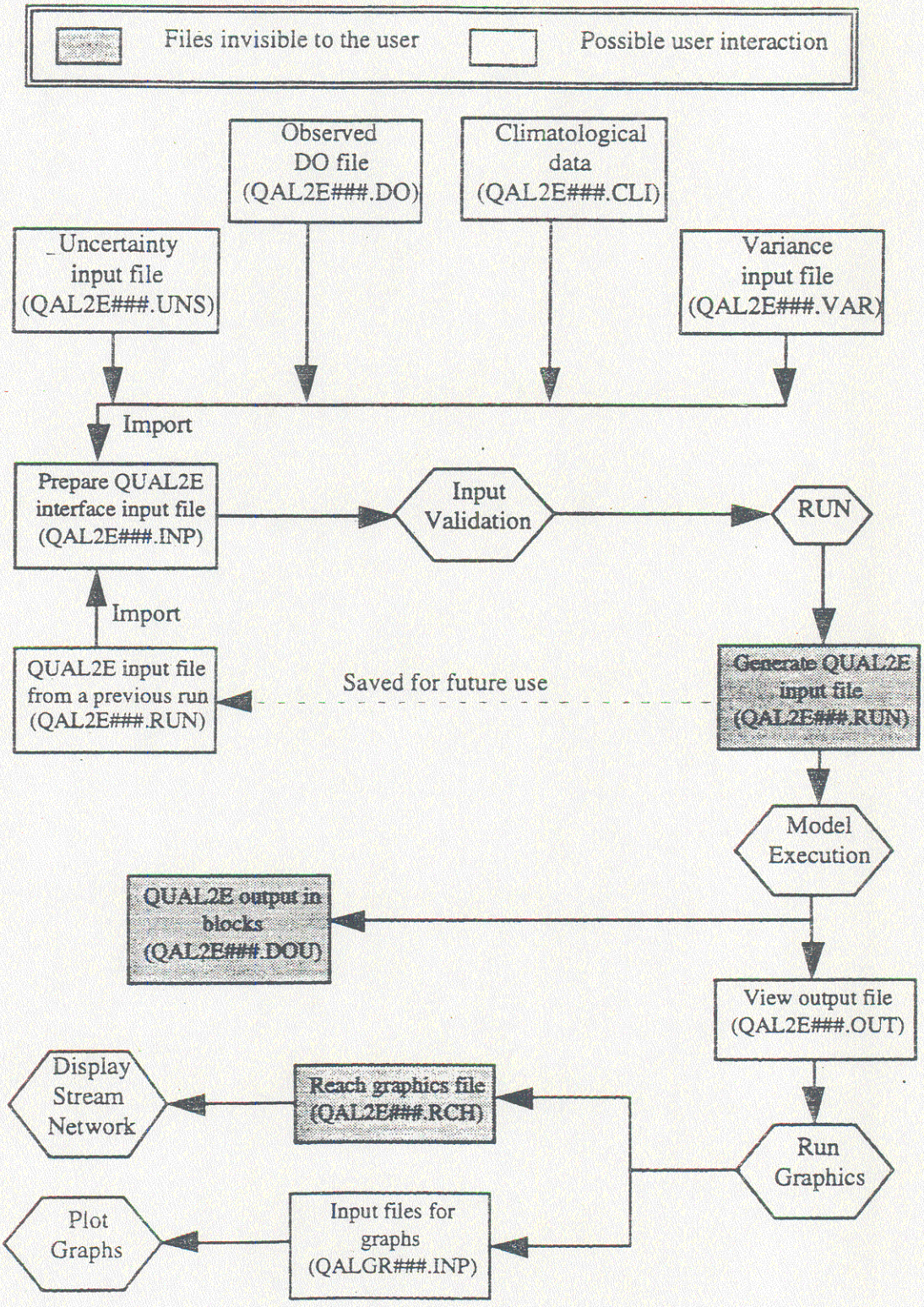

Figure 5.1 Different Files and Their Usage in a QUAL2E Model Run.

5.5 Submitting an Input File to the Model

When you have completed the input file for the interface that you are in, select the RUN button to run the model with the input file you created. When you select the RUN option, all the entries in the file will be validated. If any errors are detected during the validation, QUAL2E will put up a message informing you of the type of error detected and will then take you to the prompt that is incorrect. Once all valid entries are made, the file is submitted to the appropriate model for execution. An icon will appear at the bottom of the screen for those blocks for which the QUAL2E model is called. When the processing of the interface input file is complete, QUALE2 will execute and will ask you whether you want to view the output file. If you indicate that you wish to view the output file, QUAL2E will show it using a text editor. You can annotate the results if you choose to do so. To exit from the WRITE text editor, choose Exit from the File menu or press the ALT and F keys simultaneously (ALT-F); then press the X key. You will return to the interface screens.

5.6 QUAL2E Windows Interface Commands and Function Keys

All the Windows interface screens have a series of "buttons" immediately below the menu bar to make frequently used commands easily accessible. These buttons and the commands they represent are accessible in three ways: (1) click on a button with the left mouse key to perform the function it names, (2) press the ALT key along with the underlined letter in the button title (e.g. ALT-N for the next screen), or (3) click the left mouse button on the Tool menu and select one of the options listed underneath. However, to activate the Graphics option, click on the Utilities menu instead of the Tool menu and select Graphics.

The buttons and the commands they represent are explained below:

NEXT Button This option allows you to move to the next screen in the interface. If there are incorrect values on the screen in which you are working and you attempt to move to another screen, QUAL2E will inform you of the error and allow you the option of going back (and correcting the error at a later time) or correcting the error before moving on. The cursor will blink at the prompt with the incorrect entry if you elect to correct the error before moving on.

BACK button This button allows you to move back one screen. If there are incorrect values on the screen in which you are working and you attempt to move to another screen, QUAL2E will inform you of the error and allow you the option of going back (and correcting the error at a later time) or correcting the error before moving on. The cursor will blink at the prompt with the incorrect entry if you elect to correct the error before moving on.

INDEX Function Instead of moving backward and forward through the screens, you may use the INDEX feature to hop back and forth between screens. To access this feature, position the cursor over the INDEX button and click with the mouse button, or enter ALT-N. All the screens available in this option will be displayed with the screen titles. Certain screens will be grayed out, indicating that these screens are not accessible due to the selections made on other screens. The screen that you were in when you selected the INDEX button will be highlighted in blue text.

If you wish to see the prompts that appear on each screen, press the EXPAND button at the bottom of the INDEX screen. The screen names and numbers will then include all the prompts contained in the screens. You may contract the screen again to the normal display of just the screen names and number by clicking on the CONTRACT button.

To move to the screen that you want, position the cursor over the screen number of any non-gray screen and click the left mouse button. You are taken immediately to that screen. To exit the INDEX screen and return to the previous screen, click on the CANCEL button.

HELP button This option allows you to access the on-line help for the QUAL2E Windows interface. Two different types of help are available: **Prompt-Level Help**, which contains information on the specific prompt on which your cursor is located or on which you are entering data, and

General Help, which contains a general description of the QUAL2E system.

To access **General Help**, move the cursor to the button bar and the click on the HELP button, or press ALT-H from the keyboard. A menu will appear. Select the HELP INDEX option or enter I from the key board. A window will appear with a screen title "Description of this run." Click on the Search button on the Help Screen to find a topic. You can type in the topic or scroll through the list of available topics. When you find the topic you are looking for, click the left mouse button on the topic twice and then click on the GO TO button.

To access **Prompt-Level Help**, move the cursor over to the prompt on which you would like information and press the **F1** function key or click on the HELP button.

When you are finished viewing Help, exit the Help window either by entering ALT-F, X from the keyboard or by double-clicking the left mouse button on the icon located at the top left corner of the window. You will be returned to the screen in which you were previously working.

CALC button This option allows you to access the Calculator Function within Windows, should you require the use of a calculator at any screen in QUAL2E. You may invoke a scientific calculator by clicking on the View menu of the calculator and selecting Scientific.

TOP button This option allows you to move to the first screen in QUAL2E from any screen without having to use the INDEX function.

RUN button This option allows you to submit an interface input file that you have created to the QUAL2E model for execution. If incorrect entries are present in the file when you click on this button, QUAL2E will inform you that you have incorrect values and will take you to the appropriate prompt so that you can correct the value and resubmit the file.

RESTORE button This option allows you to restore the default values that were in the file before you started making changes for a screen. This is an option that allows you to replace pre-existing values on a particular screen without having to exit the system or go back to every variable that you changed. However, if you move to another screen, all the changes become permanent.

GRAPHICS button This option allows you to graph the QUAL2E output results. There are two types of graphs: flow vs. distance and pollutant concentrations vs. distance along the river system. The graphics routine also has the capability of drawing the network connections of the river system.

5.7 Import File Option in QUAL2E

The import file option allows you to access existing input files that are generated from other model runs. The QUAL2E interface can import all five input files: .RUN, .DO, .CLI, .UNS, and .VAR files. (See Section 5.2, File Naming Conventions.) The IMPORT option can be used to access any one of these five types of files. The filename indicates the type of data that the file contains. For example, if you import a file with a DO extension, it will replace all data on the Observed Dissolved Oxygen Screen. This option allows you to mix and match different types of data.

The IMPORT option can be selected from the menu bar at the top of QUAL2E interface window. Click on IMPORT to see a list of the five types of import files. Once you select the file type you want, you will see a window similar to the Windows Open File option, except that only one type of file will be listed. Move your cursor over the file that you would like to import and click twice in quick succession to bring the data into the QUAL2E interface. If you click only once on a filename, a short description of the file will be shown in a box at the top of the window.

5.8 How to Use the Graphics Routine

The Graphics Program can be accessed by clicking on the Graphics button with the mouse. A window similar to the QUAL2E Windows interface will appear. You can select two types of graphics: display of reaches and graphs. When a QUAL2E output file is selected, you can click on the REACHES button to view the entire stream network. There two options for plotting graphs: flow vs. distance and concentration of a water quality constituent vs. distance. The graph plotting option is provided to allow you to represent the results in easy-to-understand formats.

STEP 1. The graphics option is accessible through a GRAPHICS button on the third line from the top of the QUAL2E Windows interface screen. It is also accessible using the Graphics option under the Utilities menu (ALT-U, G).

STEP 2. The Graph Selection screen will appear. You must first select a QUAL2E output file. To see a list of the files that exist in your default directory, click on the arrow to the right of the filename box. From the pull-down menu, select the file that you would like to use as input for graphics.

STEP 3. Select the type of graph from the list provided. Then specify a starting reach and an ending reach. If the starting reach and the ending reach are not in the same branch or the ending reach is not located downstream from the starting reach, you will see a message informing you that you need to make another selection.

STEP 4. Click the RUN button when you have made all the selections on the first screen. You will see a box informing you that the selections you made will be saved under the filename shown at the top of the screen (e.g., QALGR001.INP).

STEP 5. Next you will see a list of files in a box with the title GRAPHIC SELECTION. The file that was just generated will be selected. You may select up to four graphs from the list presented. Choose OK to draw the graphs.

STEP 6. The graphs that you selected will be drawn on the screen. Once drawn, you have two options:

PRINT: To print the graphs(s) on the screen, select the GRAPH option at the top of the screen and select PRINT. The file will be printed to the default Windows printer.

EDIT: This option allows you to copy the image and paste it to any Windows application through the Clipboard. To do this, click on EDIT at the menu bar and select COPY. Then switch to the target Windows application (e.g., WordPerfect) and choose Paste or Paste Special to complete the cut-and-paste function.

The features and limitations of the graphics program include:

- The graphics routine can draw up to three pollutants for one graph. It can display two pollutants with two Y-axes for one graph.
- You can display up to four graphs at a time. You need to create the first three graphs by going through the graph plotting cycle three times and entering a new file name each time. (This is the file name shown at the top of the screen: QALGR###.INP for the QUAL2E graphs.) To change the file name, click on the File menu and choose New from the Graph Selection screen. If you do not select a new file name, when you hit the RUN button the new graph will overwrite the previously drawn graph. Finally, you need to go through a fourth cycle in which you plot the fourth graph, select all four graph files in the Graph Selection pop-up window, and choose OK.
- The observed DO data cannot be plotted along with model predicted values.

5.9 Array Screen Capabilities in QUAL2E

There are many array screens in QUAL2E, such as hydraulic data, initial conditions, and others. At these screens, you have two additional capabilities that are not available on regular screens in QUAL2E.

1. EDIT: Copy and Paste

This option is available from the menu bar at the top of the Window (ALT-E). You can use this capability to copy/cut a selected block of data (either rows or columns or both) and paste it to another area if the

same data are to be duplicated or you can use it to copy data from a spreadsheet program where you might have data (e.g., climatological data) and paste it for use by QUAL2E. To select a block, click the left mouse button on the top left cell of the desired block and drag the mouse to the bottom right cell, keeping the left mouse button pressed. The first cell selected will be highlighted rather than in reverse video as are the remaining cells in the area that you have selected. Choose Copy or Cut from the Edit menu, depending on what you would like to do. To paste the block that you just copied, move to the area to which you want to copy the block and select the Paste option from EDIT. You will see a message warning you that any data existing in the selected area will be overwritten.

To select a block that is larger or wider than a screen, proceed to the cell that will begin your block and click with the left mouse button. Then move the screen by clicking on the scroll bars so that you can view the last cell in the desired block, position the cursor above the last cell, and press the SHIFT key and the left mouse button simultaneously. This will highlight the area that you want.

2. Arithmetic Box

One of the key features of the QUAL2E Windows interface is its ability to provide mathematical calculations in columns so that you can easily change certain rows of values in an array screen (the screen where the same variable requires a row of entries).

This feature is selected by clicking on the variable title in any array, for instance, TEMP (initial temperature in the reach). A window will pop up, allowing you to do arithmetic operations for a specific number of rows in that column. You will be able to access an arithmetic function that allows you to add, subtract, multiply, or divide any single or range of values for that variable. For example, you might choose to add 3 degrees to all the values in the temperature array by using the arithmetic function.

5.10 Unit Conversion

The QUAL2E interface permits the use of either metric or U.S. units. A conversion routine has been developed for the QUAL2E interface to allow a variable's unit to be changed from one type to another. If you choose U.S. units at the beginning of the process for generating an interface input, the unit titles and default values for the variables will be supplied to the interface. If you decide later to change to metric units, the Windows interface will display a message asking whether you want the variables converted from one unit to another. If you choose YES, the interface will display the appropriate units and do the conversion for the variables that require a unit. If you choose NO, the interface will only provide the unit titles for the variables and will not convert the values.